

CHAPTER 11

RECOMMENDATIONS

11.1 INTRODUCTION

The purpose of this chapter is to draw on the work previously presented (projections of transportation activity and technology, pricing, state energy goals, and the benefits of petroleum displacement) and recommend an action plan to influence energy use in the transportation sector for state consideration. This action plan takes into consideration resource and personnel constraints.

Possible action items are divided into four basic categories: conservation; alternative fuels; research and development; and monitoring programs. Each of these categories are discussed in turn.

11.2 ENERGY CONSERVATION

11.2.1 CONSERVATION MEASURES

Potential measures to encourage transportation energy conservation are listed in Table 11-1. Energy conservation has a large potential to decrease the absolute amount of energy that would be required in comparison to a future without conservation measures.

Table 11-1
Potential Hawaii Transportation Energy Conservation Measures

Type of Measure	Description
Conservation Measures (C)	C.1 Fleet efficiency improvements C.2 Public transit improvement and expansion C.3 Transportation management associations C.4 Actions by educational institutions C.5 High-Occupancy Vehicle (HOV) facilities C.6 Automobile use disincentives C.7 Increase the focus on energy in the transportation planning process C.8 Increase the focus on energy in the land use planning process

C.1 FLEET EFFICIENCY IMPROVEMENTS

As Chapter 2 demonstrated, vehicle efficiency has a powerful effect on total ground sector energy demand. Using large enough assumptions of efficiency improvements, projected demands can decrease even while transportation activity increases. The technology for

significant increases in fuel efficiency is available. Cars that average more than 50 miles per gallon are in showrooms today, and prototypes that can run 70-120 miles on a gallon of gasoline are already developed. A recent study by the American Council for an Energy Efficient Economy shows that average new car fuel economy could be improved from 28.3 to 46.5 miles per gallon without changing safety, performance, interior space, or amenities. This study further concluded that efficiency improvements could be implemented at an additional cost of less than \$200 per vehicle (California Energy Commission, 1992). The recently-announced Advanced Car Initiative is a program to develop a car of the future with much higher energy efficiency than current models. Defense conversion efforts (including the use of government laboratories) are also being focused on improving vehicle efficiency through research.

If Hawaii were to adopt fuel efficiency standards more stringent than the national corporate average fuel economy (CAFE) standards, demand for transportation fuels of all types could be reduced. Alternatively, if the fuel efficiency standard exempted alternative fuel vehicles or gave them "credit" for the percentage of non-petroleum fuels used, the fuel efficiency standard could be used to increase demand for alternative fuels while decreasing the demand for petroleum fuels.

However, since the current CAFE law restricts states' abilities to act on fuel economy, it may require Congressional action to enable Hawaii to put more stringent fuel economy standards into place.

In spite of federal preemption of state authority in the area of vehicle fuel efficiency, the California Legislature has been examining a program called "Drive +" which would increase California's sales tax on vehicles having higher than average emissions and fuel use, and decrease the tax on vehicles below these averages. The program is intended to be "revenue neutral," that is, tax increases would offset tax rebates. Depending on details of the tax structure, such a program could influence consumer choices and result in an increase in average fleet efficiency. The tax schedule as well as legal, regulatory, financial and consumer choice attitudes and other implementation issues would need to be studied.

In the meantime, the government could set an example by improving the efficiency of its fleets. For example, a fleet rule could be established that would require the procurement of vehicles that are 2.5 mpg more efficient than the current CAFE standard, and this program could phase in at some future point for both county and state vehicles. While not saving that much energy, such a program would set an example, and introduce a larger number of people to higher efficiency vehicles.

C.2-6 TRAVEL REDUCTION MEASURES

As was shown in Chapter 3, anything that would decrease regional vehicle miles of travel (VMT) would help save energy. Chapter 3 reviewed 28 measures and concluded that those measures with the greatest potential to decrease regional VMT in Hawaii, and particularly Oahu, were:

- transit programs;
- transportation management associations;

- actions by educational institutions;
- high-occupancy vehicle (HOV) facilities and meaningful enforcement;
- automobile use limitations (such as road pricing); and
- land use planning.

Several of these measures are already under active study by transportation planning agencies, and the most effective way to reinforce the energy perspective in these ongoing studies is through the existing transportation planning process (Measure G.4).

Since single-occupant vehicle (SOV) disincentives are unpopular, the need to combine them with measures that enhance the attractiveness of HOVs is often discussed. Prior U.S. policies have emphasized HOV attractiveness. With important exceptions, SOV disincentives have generally been avoided.

The situation involving SOV disincentives is changing, however. For example:

- Los Angeles is showing the nation what is involved in implementing severe SOV disincentives. Under regulatory hammers contained in Title III of the Clean Air Act Amendments (CAAA) of 1990, the South Coast Air Quality Management District requires that employers of more than 100 employees develop ridesharing programs.
- Under the Integrated Surface Transportation Efficiency Act (ISTEA), funds are available to demonstrate programs such as road pricing. In 1993, there was some local interest in obtaining money for such a grant, but consensus could not be obtained and the application was not pursued. Federal policy is likely to continue to encourage pilot studies of the more severe SOV disincentives.

In addition, articles are now being published, such as Pucher's and Hirshman's The Path to Balanced Transportation (1993) state that making HOVs more attractive are not enough to produce substantial modal shifts without making SOV disincentives more stringent. It remains to be seen whether communities actually adopt stronger SOV disincentives without having to be prodded by environmental or other requirements, such as the Clean Air Act (CAA). The provisions of the CAA do not require SOV disincentives in Hawaii at this point.

In summary, conservation measures, particularly measures to increase average vehicle fuel efficiency, could provide major benefits for the state's energy use, and the next steps involved in implementing such measures should be pursued (see Measures R.1 and R.2 described later).

C.7 INCREASE THE FOCUS ON ENERGY IN THE TRANSPORTATION PLANNING PROCESS

Energy use currently receives little attention in the state's transportation planning process. There is statutory authority for energy concerns to play a much larger role. For example, ISTEA has energy efficiency as a goal¹ and the Clean Air Act Amendments of 1990 support

¹ From the first two paragraphs of ISTEA:

energy efficient strategies. The Western Interstate Energy Board's 1993 publication, A Road Less Traveled: New Opportunities for Changing Energy Use In Transportation, spells out the opportunities to become involved in transportation planning in more detail.

More specifically, a greater focus on energy usage would favor those measures most likely to produce a significant decrease in regional VMT. A transportation project's impacts on regional VMT should be disclosed, and used as a screen to determine each project's relative impact on energy use.

It would be helpful to update and maintain ground sector energy demand projections as VMT projections are updated to show the energy consequences of transportation policy decisions and updates to the State Transportation Improvement Plan (STIP).

C.8 INCREASE THE FOCUS ON ENERGY IN THE LAND USE PLANNING PROCESS

Similarly, land use planning at the state and local levels has not placed much emphasis on transportation energy use. Land use patterns can, over time, have a powerful effect on transportation energy use (see Chapter 3), and an increased emphasis on transportation energy use during the land use planning process (e.g., revisions to Development Plans) would help achieve state goals.

11.2.2 THE NEAR TERM PROGRAM

Measures C2, C3, and C4 could provide immediate energy savings with minimum investments of time and funding. Measures C2 and C5 require equipment purchases and/or construction. Measure C1, although potentially significant, has a somewhat lower probability of success given current vehicle purchase preferences and legal barriers. Although there are no immediate savings, Measures C7 and C8 have the greatest projected long-term energy conservation potential.

The near-term program should focus on improvements to public transportation, the organization of transportation management associations and actions by education institutions. These measures provide immediate energy savings with minimum investments in time and funding.

In the near-term, transportation planning and land use planning should begin to focus more on energy issues. Although immediate savings would not be evident, planning processes offer the greatest future impacts for energy savings.

"It is the policy of the United States to develop a National Intermodal Transportation System that is economically efficient and environmentally sound, provides the foundation of the Nation to compete in the global economy, and will move people and goods in an energy efficient manner.

The National Transportation System shall consist of all forms of transportation in a unified, interconnected manner, including the transportation systems of the future, to reduce energy consumption and air pollution while promoting economic development and supporting the Nations' preeminent position in international commerce."

ISTEA also has 15 factors to be considered in the transportation planning process, the second being "The consistency of transportation planning with applicable Federal, state, and local energy conservation programs, goals, and objectives."

11.2.3 FUTURE CONSIDERATIONS

Measures C7 and C8 have the greatest projected long-term energy conservation potential.

11.2.4 STAFFING

Each of the above conservation measures would require staffing. Estimated staffing requirements are shown in Table 11-2. Since most transportation planning and public transit functions are staffed to handle a variety of assignments, the "additional staffing" shown below is intended to indicate staff resources needed in addition to those already planned or existing.

Table 11-2.
Estimated Additional Staffing Requirements for Conservation Measures

Measure #	Description of Measure	Staffing
C.1	Fleet efficiency improvements	0.20
C.2	Public Transit	0.00
C.3	Transportation management associations	0.10
C.4	Actions by educational institutions	1.00
C.5	High-Occupancy Vehicle (HOV) facilities	0.20
C.6	Automobile use disincentives	1.00
C.7	Energy Impact considerations in the Transportation Planning Process	0.50
C.8	Increase the Focus in the Land Use Planning Process	0.10

11.3 ALTERNATIVE FUELS AND VEHICLES

There are already several hundred alternative fuel vehicles in use in Hawaii. Continued and expanded use of alternative fuels and vehicles is expected to occur in response to Federal and state requirements, public support of "clean fuels," and increasing availability of alternative fuel options on popular models of cars and trucks.

The development of a local alternative fuels and vehicle industry could provide local jobs. With respect to fuel production, alcohol fuel production from agricultural materials has the highest employment potential, although costs must be evaluated on a site-specific basis. Conversion and maintenance of alternative vehicles also offers employment potential.

The analytical tools developed in this project may be used in the design of alternative transportation fuel programs which are cost-effective in realizing state goals and objectives.

11.3.1 THE NEAR TERM PROGRAM: 1995 - 2002

As discussed in Chapter 4, near-term options for alternative fuel use in the air and marine transportation sectors are extremely limited (ethanol for use in some small planes; possible use of biodiesel in as a diesel substitute in marine applications). The near-term program recommendations, therefore, focus on the ground transportation sector only.

The results of qualitative and quantitative evaluations of over twenty potential measures and nine potential scenarios (i.e. groups of measures) for increasing use of alternative transportation fuels in the ground transportation sector were presented in Chapter 10.

11.3.1.1 LOWEST-COST, LOWEST-RISK MEASURES

Several measures were identified as being non-controversial and non-cost items. Those measures, presented in Table 11-3, are recommended as the first steps in a near-term program. Measure A.2.b.2, off-peak recharging of electric vehicles, is highly desirable from an electric utility load management point of view, since without some type of incentive and control over EV recharging times, utilities could experience increased loads at their peak load times. Measure A.6, adjustment of fuel taxes on the basis of energy content, would remove a disincentive to alternative fuel use while maintaining funding levels for highways. Measure O.2, essential for public acceptance and voluntary purchases of alternative fuel vehicles (AFVs), is already occurring.

Table 11-3.
Recommended First Steps in a Near-Term Alternative Fuels Program

A.2.b.2	Off-Peak Recharging for Electric Vehicles Available at a Reduced Rate
A.6	Adjust Fuel Taxes on the Basis of Energy Content
O.2	Public Education / Outreach

11.3.1.2 ALCOHOL / GASOLINE BLENDS

Of the potential alternative transportation fuel measures and scenarios evaluated in Chapter 10, an alcohol/gasoline blend program was the most cost-effective means of encouraging the use of significant quantities of renewable, locally-produced alternative fuels.

There are several reasons to focus on alcohol in gasoline before focusing on increasing use of alcohol fuels in fleets.

For example:

- A 10% alcohol blend in 50% of the gasolines in the state would require approximately 19 million gallons of alcohol. The number of E85 cars that would be required to create a demand for 19 million gallons of ethanol (or M85 cars for methanol) would be about 35,000 vehicles. Although there are some complexities to be dealt with in a large alcohol blending program, those issues are much less complex than the issues that

would be involved in getting 35,000 alcohol-fueled vehicles into use, especially without any locally-available fuel.

- The alcohol cost analyses in Chapter 8 indicated that low-level alcohol blends (E10) are much closer to being competitively-priced than the higher level alcohol (M85 and E85) fuels.
- The projected amount of subsidy needed for M85 and E85 fuels to compete with current gasoline prices would be even higher without the economy of scale provided by an ethanol blending program.

Therefore, a gradual introduction of alcohol/gasoline blends into the marketplace, combined with public outreach and provision of knowledgeable answers to questions from motorists, is recommended.

The objective of alcohol blending would be to have the alcohol (most likely ethanol) produced locally. Consideration should be given to replacing the existing excise tax exemption for ethanol blends by a producer incentive available only to in-state alternative fuel producers. (Analytical tools developed for this project may be helpful in comparing options).

Prior to moving forward with an alcohol/gasoline blending program, the statewide economic impacts of the specific projected levels of alcohol production should be determined (including effects of avoiding economic dislocations and value of investment and construction jobs). Incentives should be based on the extent to which the activities made possible by such incentives provide tangible benefits to Hawaii's economy and energy situation which would otherwise not be available.

11.3.1.3 ESTIMATED TIMEFRAME FOR NEAR - TERM PROGRAM

The lowest-cost, lowest-risk measures could begin to be implemented immediately. Off-peak rates could be proposed by the electric utilities to the Public Utilities Commission. A fuel tax adjustment on the basis of energy content could be introduced in the next Legislative session. Programs such as "Honolulu Clean Cities" and alternative fuel vehicle demonstrations could continue.

The first alcohol production facilities may be expected to take at least three years to come on-line, and it is unlikely that the first facilities would produce 40 million gallons all at once.² A seven-year phase-in period would be a reasonable assumption;³ thus, the estimated 1995-2002 timeframe.

² Chapters 7 and 8 provide information on potential feedstock quantities and availability, which are important factors in determining cost-effective facility sizes.

³ Actual program structure would be determined through a rulemaking process, during which all interested and affected parties would have an opportunity to discuss timing and other implementation issues.

11.3.2. THE MID-TERM PROGRAM: 2003 - 2014

A mid-term program would commence once the near-term program had reached its maximum effectiveness. By that time, if Energy Policy Act (EPACT) requirements, public outreach and fuel and vehicle availability have been consistent throughout the previous period, it is estimated that over 10,000 alternative fuel vehicles may be in use in Hawaii.

At that time it would be appropriate to re-evaluate the cost, availability, and desirability of the various alternative fuel vehicles and incentives. Both alternative fuels and alternative fuel vehicles are expected to be more cost-effective as well as widely available in popular models of cars, trucks, and heavy-duty vehicles. Hydrogen and fuel cell vehicles may have progressed to commercial availability. There may also be more information on possible use of alternative fuels in the air and marine sectors.

Vehicle purchase incentives and fuel incentives may be appropriate, as may fleet incentives and mandates. Success in this phase will depend on a reassessment of the technologies to be encouraged.

Abandonment of an alcohol vehicle program may be necessary at this point if manufacturers do not supply large numbers of diverse models of alcohol vehicles. The manufacturers' decisions are beyond Hawaii's control.⁴ However, program risk to this point will have been small because the local alcohol production will still be small enough to be absorbed by the gasoline blend component of the strategy, and alcohol flexible-fuel vehicles (FFVs) could be operated on low-level blends if high-level alcohol blends appear uneconomic.

An expanded alcohol program, however, may be desired. Success for an alcohol strategy would depend on a well-coordinated plan to get through the transition quickly, to minimize excess costs, and on the continued supply of alcohol vehicles. The program may need to focus on one alcohol to avoid duplication of fuel storage and distribution systems and simplify public education and support. If fuel costs are still higher than for gasoline and diesel, one method of reducing the price at the pump for high level blends (without interfering with low-level ethanol blends) would be to reduce or eliminate state and county highway taxes on alternative fuels. This could be a temporary reduction, to be phased back in before the number of alternative fuel vehicles getting a "free ride" on the highways became too burdensome.

Electric vehicles may also be widely available (California's requirement for 2003 is that 10% of new light-duty vehicle sales are to be zero emission vehicles). Public interest and support of electric vehicles may create support for infrastructure development (quick-charge and opportunity charging locations), including charging at public facilities (on-street parking, schools, scenic points).

If information on vehicle preferences has been obtained prior to this point, such information could form the basis for a new assessment of the most effective measures to encourage continued and increased use of alternative fuel vehicles.

⁴ It would be affected by national considerations of EPACT evolution, Corporate Average Fuel Economy Standards and mainland air quality programs.

11.3.3 THE MATURING PROGRAM

In the mature program, alternative fuels would have achieved cost-effective scales of production and distribution, and government subsidies and incentives would be phased out.

11.3.4 ESTIMATED EFFECTIVENESS OF RECOMMENDED PROGRAM

Future fuel demand and number of alternative fuel vehicles were estimated for a near-term program (with recommended measures and a seven-year phasing in of alcohol blending in gasoline) followed by a mid-term program with increased fleet use of alternative fuel vehicles. Results are shown in Figures 11-1 and 11-2.

Figure 11-1.
Estimated Gasoline and Diesel Demand, Recommended Program

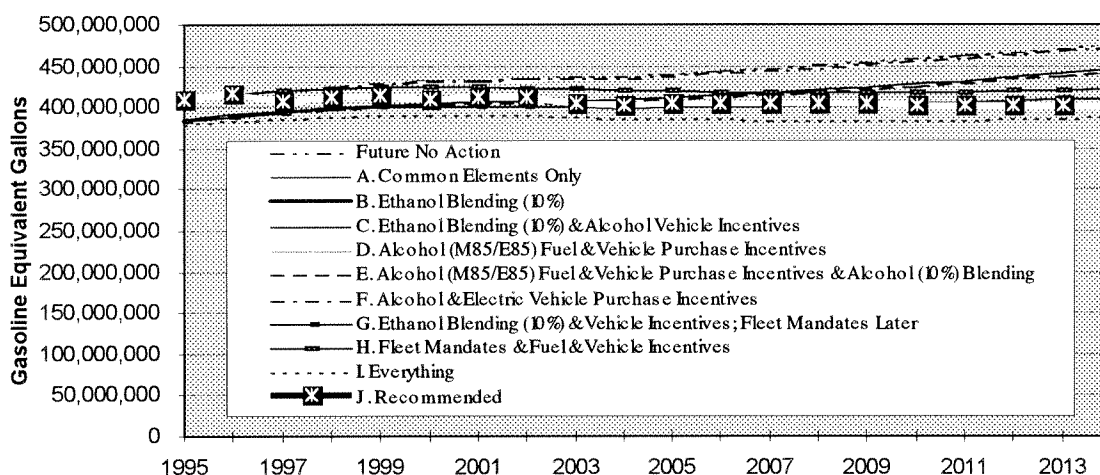
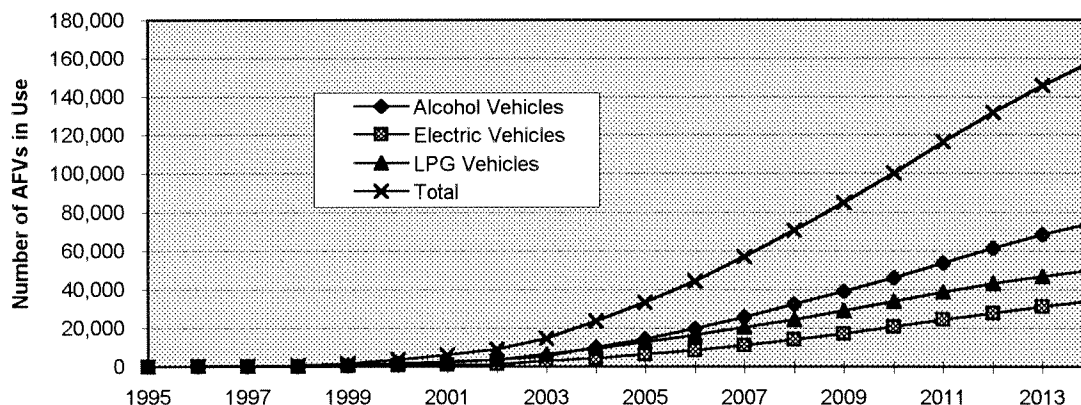


Figure 11-2.
Projected Number of Alternative Fuel Vehicles, Recommended Program



As shown, the recommended gradual phasing in of alcohol-blended fuels, followed by increased focus on alternative fuel vehicles in fleets, results in a projection of gradually

increasing displacement of gasoline and diesel fuel (with absolute demand for gasoline and diesel fuel remaining relatively constant). As discussed previously, this is only one of several possible approaches. Depending on resources and support, a more or less aggressive approach may be warranted.

11.3.5 STAFFING

The alternative fuel program would require additional staffing. Estimated staffing requirements for near-term measures are shown in Table 11-4.

**Table 11-4.
Minimum Staffing Requirements Associated With Near-Term Alternative Fuel Measures**

Measure #	Description of Measure	Initial	Ongoing
A.1	Alcohol or Other Oxygenate Requirement for Gasoline	1.00	0.25
A.2.B.2	Off-Peak Recharging for Electric Vehicles Available at a Reduced Rate	0.05	0.00
A.6	Adjust Other Fuel Taxes on the Basis of Energy Content	0.10	0.00
0.1 - 0.4	Public Education & Outreach; Information Dissemination	1.70	1.70
	TOTAL	2.85	1.95

It should be expected that the speed and ease of implementation of these measures, as well as overall program effectiveness, will be directly related to the level (quality and quantity) of personnel assigned to implement the various measures. If personnel are not available to meet the minimum staffing requirements listed above, it is recommended that implementation be delayed until sufficient personnel are available.

11.4 RESEARCH AND DEVELOPMENT

11.4.1 RESEARCH AND DEVELOPMENT PROGRAMS

Research and development programs could play an important part in Hawaii's achievement of its energy goals. Potential areas of research and development are listed in Table 11-5.

Building partly on measures described in other sections, the following research and development programs could be pursued as part of an integrated approach. While topics in both tiers are viewed as important, the first tier topics may be more immediate than the second tier topics.

FIRST TIER TOPICS

R.1 Regulatory Analysis, Legal Review and Consumer Study on Increasing In-State Fuel Efficiency

This study is directly related to Measure C1. Such a study would address such issues as:

- What level of fees would effect consumer choice in selecting an efficient vehicle?;
- At what point to impose the fees (e.g. as a sales tax or as an annual registration fee)?;

**Table 11-5.
Potential Hawaii Research and Development Programs**

Type of Measure	Description
Research and Development Programs (R)	First Tier
	R.1 Feasibility study on increasing in-state vehicle fuel efficiency
	R.2 Further Study of Measures to Decrease Regional VMT
	R.3 Fleet rules
	R.4 Study of Hawaii-specific barriers to alternative fuels
	R.5 Continued support and expansion of demonstration programs
	R.6 Monitoring of demonstration programs on the mainland
	R.7 Maintaining dialogue with manufacturers on state interest in ethanol FFVs
	R.8 Updating and refining alternative fuel cost estimates
	Second Tier
	R.9 Study of incentives for AFVs
	R.10 Monitoring manufacturer offerings and consumer acceptance
	R.11 Evaluation of biodiesel compatibility with existing infrastructure
	R.12 Study further state backing of industrial development bonds
	R.13 Monitor progress in reducing the technical barriers
	R.14 Monitor research using MSW and other wastes to make alcohol
	R.15 Evaluate primary and secondary economic impacts of a local fuels production industry
	R.16 Further evaluation of cost and logistics of transport of alternative fuels between islands and between terminal facilities
	R.17 Survey of Hawaii-specific vehicle purchase preferences
	R.18 Survey of fleets
	R.19 Fund other research as appropriate and feasible

- How would this revenue neutral fund operate? One option would be to not specify the amount of the rebate until revenues for the fiscal year are known, then apportion rebates on a formula basis. However, this would dilute the effect of the rebate since prospective purchasers would not know the rebate amount at the time of purchase;
- Would the fee apply only to new car sales or also used car sales?

While the feebate could be based on energy efficiency, it could also be based on emission levels.

Another possible way to increase fleet efficiency is to subsidize the scrapping of older, low efficiency vehicles. UNOCAL sponsored a program in California where, in order to obtain air quality increments for its own development, it funded the purchase of higher polluting, pre-1973 vehicles. This type of program appears to be most cost-effective for areas which (unlike

Hawaii) face high incremental costs for air quality improvements. According to an Office of Technology Assessment report, "The generally favorable cost-effectiveness of early retirement programs in nonattainment areas does not apply to programs in areas complying with air quality standards" (U.S. Congress, 1992).

R.2 Further Study of Measures to Decrease Regional VMT

Issues associated with the implementation of one type of automobile use limitation, road pricing, include:

- cost of monitoring equipment;
- availability of reasonable alternatives to SOV travel;
- federal restrictions on tolls on federally funded highways;
- its apparent regressiveness; and
- details of the fee structure.

A new Environmental Defense Fund analysis (Environmental Defense Fund, 1994) claims to show that congestion pricing is not regressive and is very cost effective.

ISTEA funds are available to fund a pilot road pricing program, but although there is some local interest, Hawaii has not submitted an application to date.

Another way to reduce VMT is to transfer certain costs (such as automobile insurance and vehicle registration fees) from the basis of vehicle ownership to the basis of vehicle travel, making the incremental cost per vehicle-mile of travel more expensive. With the current system, if vehicle ownership costs are \$3,500 per year, and incremental costs (gasoline, oil, maintenance, and tires) are 8 cents per mile, the total cost to drive 10,000 miles annually is 36 cents per mile. However, the total cost to drive 20,000 miles annually is 28 cents per mile (American Automobile Association, 1991). Transferring auto insurance to pay-at-the-pump (also known as a pay-as-you-drive system) would add approximately 5.09 cents to the price of a gallon of gasoline (El-Gasseir, 1990) with liability insurance being removed from vehicle ownership costs.

Under a pay-at-the-pump system, the high mileage driver would pay slightly less in total costs per year (due to fewer uninsured motorists on the road), but incremental costs as a proportion of total costs would change from 38 percent to 47 percent. This would provide greater incentive to reduce vehicle miles traveled. Fuels with lower energy content should be assessed less per gallon.

R.3 Research Fleet Rules

This is related to Measure A.13, fleet purchase requirements. Rather than direct implementation of fleet rules, the area could be researched, drawing upon fleet requirement experiences in other states, particularly those which implemented fleet rules as part of their air quality plans. The results of the research could be presented by DBEDT in informal working groups with fleets.

R.4 Identify Solutions To Hawaii-Specific Barriers to Alternative Fuels

Several barriers to the introduction of alternative fuels in Hawaii have been identified in this study; additional study and evaluation would answer questions and increase levels of confidence in several areas. For example, how can the cost and logistics of inter-island transport of small quantities of alternative fuels be improved? How would battery recycling work in Hawaii? How would an electric vehicle (EV)-friendly city provide EV quick-charging, opportunity charging, or even overnight charging for condominium dwellers or hotel guests? Which fleets have operational needs which are matched by a particular alternative fuel, and how can those fleets be identified?

Public perception of the alternative fuels may also be a barrier to acceptance and use of alternative fuels and AFVs. What are the particular aspects of alternative fuels which cause potential alternative fuel users in Hawaii the most concern? Which aspects are most attractive to potential alternative fuel users? Surveys, interviews, and “focus groups” have been used in other cities to identify answers to the “fuel attractiveness” questions; these cities may soon be compiling actual purchase data to validate and modify the results of their surveys and focus groups. Hawaii may be able to benefit from the survey instruments and approaches developed elsewhere, and to use them to determine Hawaii’s specific concerns and interests.

R.5 Continue to Support and Expand Demonstration Programs

Demonstration programs have many benefits, including:

- the development and maintenance of the “intellectual infrastructure” for future AFV technology transfer;
- provision of an entry point for specific fuels, since demonstration programs could be the first step in a progression to larger introduction of AFVs and development of refueling infrastructure;
- sparking interest; and
- obtaining data.

There is currently a methanol demonstration program in the state. This should be considered the “alcohol” demonstration program. The price of ethanol should be monitored, and if and when ethanol seems appropriate, the demonstration program could be modified.

A demonstration program for heavy-duty alcohol engines and vehicles should be considered because the provision of alternative fuel vehicles in this sector needs encouragement. There is also an EV demonstration program in the state, the Hawaii Electric Vehicle Demonstrative Program (HEVDP). As discussed elsewhere, an EV purchase requirement may be appropriate at about the time the HEVDP winds down.

R.6 Monitor Demonstration Programs on Mainland

Hawaii should be informed by mainland experiences. This information may be forwarded to fleet managers and others through the outreach and public education measures.

R.7 Maintain Dialogue with Manufacturers on State Interest in Ethanol FFVs

Since the Hawaii light duty vehicle market is too small to affect manufacturer offerings, Hawaii will have to use the alcohol FFVs provided by the manufacturers. The state should keep abreast of methanol-ethanol conversion issues, and be sure the manufacturers know about Hawaii's interest in ethanol. Hawaii needs to monitor carefully the availability of ethanol vehicles. Encouraging the production of E85 FFVs may increase the likelihood of continued and increased availability of these vehicles.

R.8 Update and Refine Alternative Fuel Cost Estimates

It is important to update, refine and maintain the cost estimates presented in Chapter 8 to reevaluate issues of subsidies and fees as technology and other conditions change.

SECOND TIER TOPICS

R.9 AFV Incentives

This topic is related to Measure A.19 which states possible initial values for financial incentives. Also worthy of study, however, are non-financial incentives such as AFV access to HOV facilities, preferred parking arrangements, exempting AFVs from mileage standards, exempting AFVs from road pricing, and so on. To what degree could these non-financial incentives increase AFV adoption? It may be appropriate to propose non-financial AFV incentives along with financial incentives. The use of surveys and focus groups may be appropriate techniques to study these issues.

R.10 Monitor Manufacturer Offerings and Consumer Acceptance

The state should monitor manufacturer offerings, which are constantly changing, particularly including ethanol FFVs, which get less promotion than methanol FFVs. The domestic car manufacturers have staff knowledgeable about their alternative vehicle offerings, and these offerings could be monitored through periodic contact with appropriate staff. The state should also encourage manufactures to continue to study consumer acceptance of AFVs and share this information with the state so that the state can implement measures to encourage public adoption of AFVs. Finally, the state could monitor AFV adoption patterns in other states and adjust local programs in response to mainland experiences.

R.11 Monitor and Conduct Research on Biodiesel Compatibility with Existing Infrastructure

This topic should be studied in more detail to determine the extent of infrastructure barriers to biodiesel introduction, should the production costs of biodiesel fall in the future. Barriers could be regulatory as well as technical. One approach would be to analyze each step of the biodiesel production, distribution, blending and utilization cycle, and assess potential barriers at each step.

R.12 Study Further State Backing of Industrial Development Bonds

There will be repeated calls for the state to back alternative fuel production facilities. Rather than dealing with these piecemeal, a strategy to deal with these requests could be developed. For example:

- application and review cycles could be advertised so that competing projects could be reviewed simultaneously;
- review criteria that relate to state energy and economic development goals could be established and publicized; and
- categories of preferred projects could be established and publicized.

R.13 Monitor Progress in Reducing the Technical Barriers

The technical barriers affecting AFV use are constantly being addressed on the mainland. The state should monitor the removal of various technical barriers through newsletters, conferences, and communications with knowledgeable parties.

R.14 Monitor Research Using MSW and Other Wastes to Make Alcohol

MSW and other waste feedstocks are inexpensive, if not free. A working relationship between energy experts and solid waste experts should be maintained, and possible production of fuels from waste should continue to be discussed.

R.15 Evaluate Primary and Secondary Economic Impacts of a Local Fuels Production Industry

It will be important for the primary and secondary economic impacts of alternative fuels utilization and a local alternative fuels production industry to be assessed and publicized. Secondary impacts would include indirect employment (through direct and indirect purchases made by the new industry), a reduction in the flow of money out of state for energy purchases, increased state and local revenues, and, if the area is economically distressed, a reduction of emergency aid ("welfare") payments.

R.16 Further Evaluation of Cost And Logistics of Transport of Alternative Fuels Between Islands and Terminal Facilities

The logistics assumed in this study are conservative and based on current liquid fuel distribution facilities.⁵ If ethanol blending was occurring on a large scale, new distribution facilities would probably be constructed to enhance efficiency. Previous ethanol blending was accomplished at an underground tank at Honolulu Harbor; this tank has since been removed. Tank re-installation near the existing gasoline distribution facilities or a storage tank at Barber's Point and a smaller one at the Honolulu gasoline terminal may enhance efficiency, depending on the ethanol production locations.

⁵ For example, the ethanol blending scenario assumes an ethanol terminal at Barber's Point and a gasoline terminal at Honolulu Harbor. The tanker truck driver would first go to Honolulu Harbor to load gasoline and then proceed to Barber's Point to load in 10% ethanol.

R.17 Survey of Hawaii-Specific Vehicle Purchase Preferences

The vehicle preferences used in this study were based on surveys conducted in California, and Hawaii purchasers may have different preferences. It may be possible to borrow California's survey method (thus avoiding development costs) and replicate the survey to determine Hawaii preferences. This would help refine estimates of types and magnitude of voluntary AFV purchases.

R.18 Survey of Fleets

Results could help to match AFVs to fleets whose needs and preferences fit the AFVs' attributes. This could be done as a joint cooperative project with private AFV manufacturers or converters, possibly through the "Honolulu Clean Cities" mechanism.

R.19 Fund Other Research as Appropriate and Feasible

Unanticipated research priorities could arise.

11.4.2 THE NEAR-TERM PROGRAM

Because alcohol blending is part of the recommended near-term program, research should focus on the issues specific to Hawaii's alternative fuel program, such as cost and logistics of transporting alcohol between terminal facilities. Research on alcohol production from crops is timely because of the recent changes in Hawaii's agricultural industry. Economic impacts of local fuel production should be evaluated.

Additional research and development plans should focus on programs to evaluate fleet purchase requirements and their efficiency in other states. Rather than impose an arbitrary system in Hawaii, experiences in other states, especially those that imposed fleet rules for air quality, should be examined.

Methods to reduce the number of vehicle miles traveled and programs to increase fuel efficiency should continue to be part of the state's transportation research agenda.

11.4.3 STAFFING

Each of the above measures would require some degree of staffing. Staffing requirements of major measures are estimated in Table 11-6.

Table 11-6.
Estimated Staffing Requirements Associated With Research and Development Measures

Measure #	Description of Measure	Estimated Staffing
First Tier		
R.1	Feasibility study on increasing in-state vehicle fuel efficiency	0.20
R.2	Further Study of Measures to Decrease Regional VMT	0.10
R.3	Draft fleet rules	0.50
R.4	Study of Hawaii-specific, non-cost barriers to alternative fuels	0.10
R.5	Continued support and expansion of demonstration programs	0.25
R.6	Monitoring of demonstration programs on the mainland	0.10
R.7	Maintaining dialogue with manufacturers on state interest in ethanol FFVs	0.10
R.8	Updating and refining alternative fuel cost estimates	0.15
Second Tier		
R.9	Study of incentives for AFVs	0.25
R.10	Monitoring manufacturer offerings and consumer acceptance	0.10
R.11	Evaluation of biodiesel compatibility with existing infrastructure	0.20
R.12	Study further state backing of industrial development bonds	0.10
R.13	Monitor progress in reducing the technical barriers	0.25
R.14	Monitor research using MSW and other wastes to make alcohol	0.10
R.15	Evaluate impacts of local fuel production	0.25
R.16	Evaluate cost and logistics of transport	0.25
R.17	Survey Hawaii-Specific Vehicle Purchase Preferences	1.00
R.18	Survey Fleets	0.20
R.19	Fund other research as appropriate and feasible	0.10

11.4.4 FUNDING

Some of the measures described may be self-supporting, particularly those with immediate benefits to participants, such as cost savings. Several of the programs may be funded with federal grants. Cooperative arrangements may also reduce public sector costs and increase success, especially for those programs for which investment decisions will be based on the results of the research and development work.

11.5 MONITORING

Tracking the cost and effectiveness of the transportation energy measures will allow the most effective elements to be identified and strengthened, and less-effective or overly costly elements to be revised or discontinued.

11.5.1 MONITORING PROGRAMS

Potential monitoring programs are listed in Table 11-7.

**Table 11-7.
Potential Monitoring Programs**

Type of Measure	Description
Monitoring Programs (M)	M.1 Address data deficiencies M.2 Update energy demand projections M.3 Monitor and report on effectiveness of requirements and incentives

It is important to improve the state's energy statistics. Key information to be collected in the area of transportation energy include:

- data on vehicle exports and scrap rate to be able to calculate fleet turnover better;
- annual miles traveled per vehicle; and
- number of vehicles in centrally fueled fleets.

The known problems with the Act 65 data indicate a need for better quality assessment/quality control (QA/QC) on the data collected. There is also a need to centralize the data on energy parameters.

Appropriate data collection systems will need to be developed so that there is appropriate data for the periodic Energy Resource Coordinator reports. Such parameters as alternative fuel volumes, petroleum displacement, and numbers of AFVs will need to be collected.

Data collection is a key step for the state's energy program. Without accurate data to develop and guide the program, legislative decisions will be stalled and consumers will not support alternative energy in the transportation sector.

11.5.2 STAFFING

Each of the above measures would require some degree of staffing; staffing requirements of measures are estimated in Table 11-8.

**Table 11-8.
Estimated Staffing Requirements Associated With Monitoring Measures**

Measure #	Description of Measure	Estimated Staffing
M.1	Address data deficiencies	0.10
M.2	Update energy demand projections	0.10
M.3	Monitor and report on effectiveness of requirements and incentives	0.10

11.6 SUMMARY/CONCLUSIONS

This report is the basis for an action plan to influence energy use in the ground transportation sector. Experience on the mainland and elsewhere has shown the need for successful programs to be integrated, publicly-supported packages of requirements, incentives, research, outreach and public information, governmental actions and monitoring programs. Because of these interrelationships, it is appropriate to integrate all elements relating to ground sector energy use into a package addressing conservation, alternative fuel supply and demand, and AFV supply and demand.

An alcohol gasoline blend program is the most cost-effective means of encouraging the use of significant quantities of renewable, locally produced alternative fuels. As discussed in Chapter 10, projected costs may be justifiable since jobs would be preserved and created immediately as energy crop production commenced.

State transportation energy efforts should focus on energy conservation and to a lesser degree, congestion relief. The goal of energy conservation efforts would be to increase the average fuel efficiency of motor vehicles in the state and change travel behavior and land use patterns. Improving and expanding public transportation and other methods of decreasing vehicle miles traveled would have immediate energy savings, while transportation and land use planning would have the greatest projected long-term energy conservation potential. The near-term program should focus on improvements to public transportation, the organization of transportation management associations and actions by educational institutions.

Research and development programs would also play an important part in the achievement of Hawaii's energy goals. In the near-term the state should research such areas as alcohol production and transportation, fleet purchase requirements and their effectiveness in other states, methods to reduce the number of vehicle miles traveled, and programs to increase fuel efficiency.

Reduced cost off-peak rates for EV recharging, adjusting fuel taxes based on energy content, and public education programs are recommended low-cost and low-risk components of a near-term alternative fuels program.

The near-term alternative fuels program would last about seven years. By that time it is estimated that about 10,000 alternative fuel vehicles would be in use in Hawaii. At the beginning of the mid-term program, it would be appropriate to reevaluate the cost, availability and desirability of the various alternative fuel vehicles and incentives. Fleet incentives and mandates may also be part of the mid-term program. In the mature program, alternative fuels would have achieved cost-effective scales of production and distribution, and government subsidies and incentives would be phased out.

A balanced approach incorporating conservation, alternative fuel measures, research and development, outreach and monitoring is recommended for the ground transportation sector. Reduced off-peak recharging rates for EVs, fuel taxes based on energy content and public education programs are essential first steps in a program to encourage continued and expanded use of alternative fuels and vehicles. Alcohol blending, fleet purchase mandates and vehicle purchase incentives could also be implemented. Conservation measures such as public transportation, transportation management associations and actions by educational institutions, must be central to state policy if congestion and the number of vehicle miles traveled are to be reduced. Research and monitoring of ground transportation sector energy issues need to continue and the public must be educated and informed of the options and policies affecting transportation in the state.